BLACK-LIGHT TRAPS TO CONTROL HICKORY SHUCKWORMS ON PECANS

ARS-S-105
March 1976

AGRICULTURAL RESEARCH SERVICE • U.S. DEPARTMENT OF AGRICULTURE

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BLACK-LIGHT TRAPS TO CONTROL HICKORY SHUCKWORMS ON PECANS

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ABSTRACT

Studies were conducted from 1970 to 1972 in an isolated 8-acre pecan orchard near Sasser, Ga., to determine whether hickory shuckworms could be suppressed by orchard coverage of traps equipped with 6-watt black-light lamps when placed in the canopy of pecan trees. In 1970, following removal of 15-watt survey traps used in a 1967–69 suppression test, the shuck infestation increased to 71.6 percent, compared to 99 percent for unsprayed check trees outside the orchard. In 1971, when two tree traps per acre were operated, the shuck infestation was reduced to 2.3 percent inside compared to 72 percent outside the orchard. In 1972, when one tree trap per acre was used, shuck infestations were 21 percent inside and 42 percent outside the orchard. This increase in 1972 could have resulted from the decrease in trap density, reduced pecan production, or a combination of the two.

INTRODUCTION

For years pecan growers in the Southeastern States have controlled the hickory shuckworm, *Laspeyresia caryana* (Fitch), by spraying the trees with chemical insecticides from early August through September. While this approach has provided varying degrees of control (*3*),[2] repeated applications of certain chemicals used on pecans not only kill the target pest, but also eliminate beneficial insects, disrupting whatever insect balance there is in the field. This promotes the reentry of the target pest, which makes it necessary to reapply insecticides to prevent severe crop damage. According to Van den Bosch (*7*), this approach speeds up a genetic process by which insect pests become increasingly resistant to pesticides.

Recently, research has been concentrated on alternative methods that reduce or eliminate the use of broad-spectrum insecticides for insect control. As Knipling (*2*) stated, such programs are necessary to control pests that have developed tolerance to certain insecticides and to reduce the populations that cannot be effectively handled by chemical treatments. One such approach is the use of traps equipped with black-light lamps to attract and capture night-flying adult insects.

In 1966, Tedders and Osburn (*6*) found that several economically important pests of pecan, including the hickory shuckworm, were captured in large numbers in a trap equipped with a black-light lamp as an attractant. Therefore, in 1967, they designed and installed a high-density black-light trapping experiment (four 15-watt black-light traps per acre) in an effort to suppress shuckworm populations in an isolated 8-acre pecan orchard near Sasser, Ga. Results of these tests were published by Tedders et al. (*5*) for the years 1967–69. The suppression of shuckworms by these traps was comparable to that which could be anticipated with recommended insecticides.

Later, Tedders and Edwards (*4*) designed and

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[2] Italic numbers in parentheses refer to items in "Literature Cited" at the end of this publication.

built a 6-watt black-light trap which, when suspended in the tree canopy, caught fewer nontarget insects than the standard 15-watt survey trap (*1*) used in the orchard suppression test. It was also less expensive to build, install, and operate, and required less servicing.

These results encouraged us to continue the test in the same 8-acre orchard, using the 6-watt black-light trap (hereafter referred to as the Tedders tree trap). This report gives the results of these tests during the 1970–72 seasons. The 1967–69 nut infestation data compiled by Tedders et al. (*5*) are included to permit comparison of the populations over a 6-year period.

EQUIPMENT AND PROCEDURE

In 1970, following the extensive trapping program, one 15-watt black-light survey trap was operated near the center of the 8-acre orchard one night per week from June 16 to October 28 to determine whether or not the shuckworm population would recover. Then in 1971, 17 Tedders tree traps (fig. 1) were installed (a density of 2 traps per acre); in 1972, 8 traps (1 per acre) were used. Traps were spaced so as to divide the area among them as equally as possible. The tree trap consists of a 6-watt black-light lamp (F6T5–BL) mounted horizontally across the mouth of a 10-inch tractor gasoline funnel fitted into the cover of a 2-quart plastic freezer container for holding the insects. A strip of dichlorvos-impregnated plastic (Vapona) was placed inside the container to kill the captured insects. A drain was placed in the bottom of the collection container to keep the sample dry for easy insect identification. Each trap was hung 15 feet above ground level in the canopy of a pecan tree, suspended on a rope that passed over a pulley so it could be lowered easily.

Electrical power to the traps was provided by a system of four 120-volt subcircuits connected to the same source used in previous years. Traps were energized each year from March 15 through November 10.

The method of data collection remained essentially the same throughout the 1970–72 period as in previous years. Effectiveness of the traps in suppressing the shuckworm population was measured by comparing the number of pecan shucks infested by shuckworms inside and outside the 8-acre orchard. Samples of nuts with

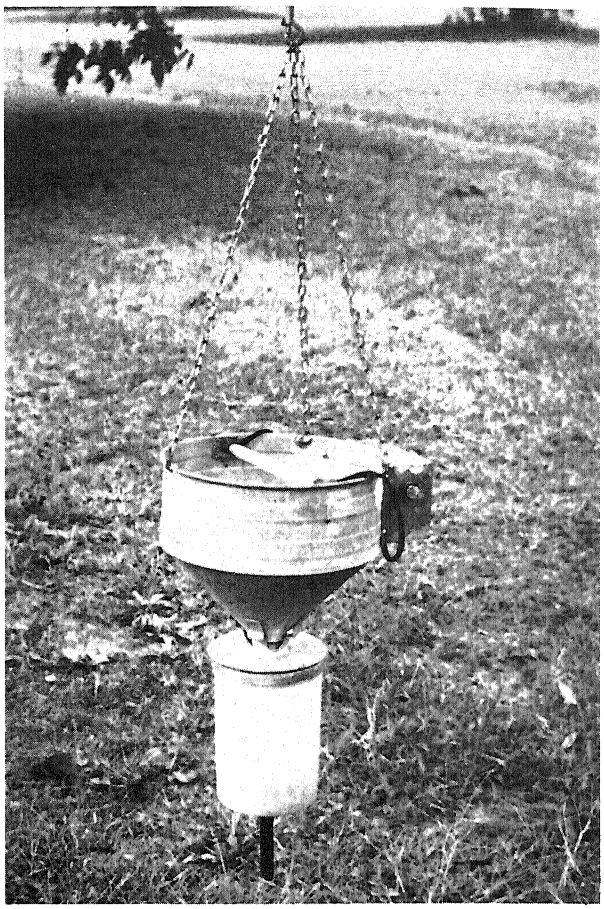

FIGURE 1.—Tedders tree trap suspended from pecan tree.

shucks were collected from 29 check trees inside and from 8 check trees about one-half mile from the orchard during mid-October.

The shuckworm moths captured in the traps were sampled one night per week, usually on Tuesday or Wednesday, and shuckworm counts made the following day.

An annual disease protection program was carried out each year in the 8-acre orchard; it included five applications of the fungicide duTer (hydroxytriphenyltin) and one or two applications of demeton, an aphicide-miticide known to be ineffective against shuckworms. No disease or insect protection was used on the eight outside check trees.

RESULTS AND DISCUSSION

A summary of the nut infestation data for all years appears in table 1, comparing data from the 29 check trees inside the orchard and 8 check trees located about one-half mile from the

TABLE 1.—*Percentage of pecan shucks infested by hickory shuckworms within and outside the trap-treated orchard*

Year	Traps per acre	Infested shucks (percent)		Pecan production in orchard (pounds)
		Within orchard	Outside orchard	
		15-watt survey trap		
1967	4	17.6	74.8	5,107
1968	4	10.6	68.5	2,269
1969	4	1.2	39.5	6,329
		No traps		
1970	0	71.6	99.0	[1]400
		6-watt Tedders tree trap		
1971	2	2.3	72.0	2,544
1972	1	21.0	42.0	[1]400

[1] Production estimated since only about 200 pounds of samples were gathered. It was not economically justifiable to gather the nuts.

orchard. These counts show that infested pecan shucks within the orchard were reduced from 17.6 percent in 1967 to 1.2 percent in 1969, while the infestation level outside was 74.8 percent in 1967 and declined to 39.5 percent in 1969. In 1970, with only one trap operating one night per week in the orchard, the infestation level inside the orchard was 71.6 percent, compared to 99 percent outside the orchard.

Following the seasonal operation of the Tedders tree traps in 1971 at a density of two traps per acre, the shuck infestation level within the orchard was 2.3 percent as opposed to 72 percent outside the orchard. In 1972, with one trap per acre, the infestation level was 21 percent inside the orchard and 42 percent outside the orchard. Thus, the percentage reduction inside as compared to the outside of the orchard was 97 percent in 1971 and 50 percent in 1972.

Seasonal abundance of the hickory shuckworm population in the 8-acre orchard from June 23 through November 10, 1970, and from March 15

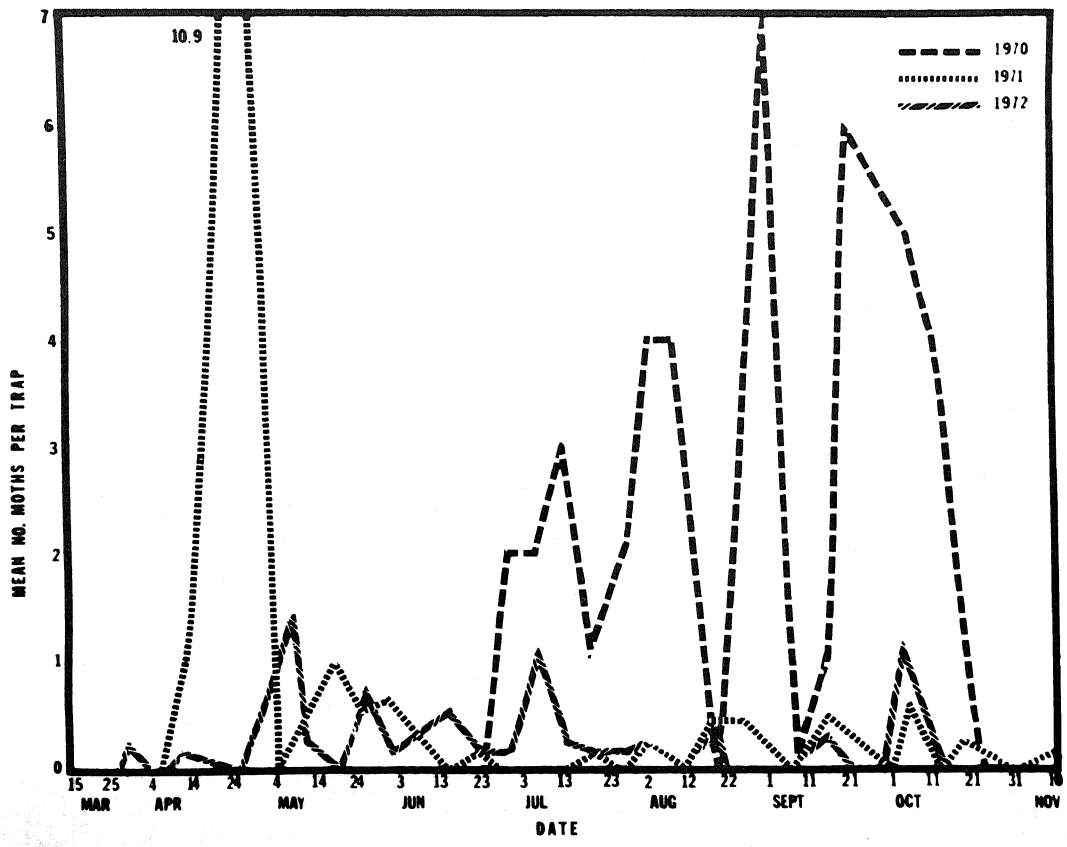

FIGURE 2.—Mean weekly catch of hickory shuckworm moths per black-light trap inside 8-acre pecan orchard, 1970–72.

through November 10 for 1971 and 1972 is presented in figure 2. In the absence of a trapping program in 1970, the one monitor trap showed the adult population building up around the first of June and continuing at a high level until mid-October. This large fall generation resulted in a high spring emergence of overwintering shuckworm moths (considered to be a suicidal generation since the adults emerge before the development of the host, the pecan nut) in April 1971. With the placement of two traps per acre in 1971, the population following the high spring emergence remained low for the remainder of the season. In 1972, when the traps were reduced to one per acre, the spring population failed to build to very high numbers, perhaps because the population failed to build up at the end of the 1971 season.

In comparing shuck infestation counts to adults captured in black-light traps (assuming trapping data indicate the population) from July 1 to October 19, the period in which the shuckworms cause maximum damage, it appears that there is a definite relationship between the two criteria used in evaluating the population. In 1970, when no traps were operating in the orchard, the fall shuck infestation level reached 72 percent, while during the same period adult capture in the black-light traps averaged 2.4 moths per trap per night. Orchard coverage of two traps per acre in 1971 reduced the shuck infestation to 2.3 percent with a catch of only 0.16 moth per trap-night per week. In 1972, after a reduction of one trap per acre, the fall infestation count increased to 21 percent, with a catch of 0.18 moth per trap-night per week. The only known variable other than trap density that might have affected the percentage of shuck infestation was differences in production of pecans between 1971 and 1972 (table 1). According to Tedders et al. (*5*), in general pecan culture an infestation of less than 25 to 30 percent in shucks of mature pecan nuts collected in October is not economically important.

In conclusion, the results obtained in 1971 and 1972 indicate that the use of one to two 6-watt Tedders tree traps per acre suppressed the hickory shuckworm below an economic level in the one isolated 8-acre test orchard near Sasser, Ga. The degree of suppression with two traps per acre appears to be as great as with the more expensive 15-watt survey traps that were used at four traps per acre in previous tests in 1967–69. Whether similar results can be obtained in other pecan orchards has not been demonstrated. However, experiments to test the possibility are being conducted in orchards at the Southeastern Fruit and Tree Nut Research Station, Byron, Ga.

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